Prosiding Simposium Pengurusan Teknologi, Operasi & Logistik, (SIPTIK IV)
14-16 Mei 2013, Universiti Utara Malaysia

FAILURE COSTS AND COST PREDICTABILITY IN CONSTRUCTION PROJECTS

[1]Low Sook May, [2]Puah Chooi Yen, [3]Pisteos Mak Xin Yang, Mohd Nasrun Mohd Nawi, Wan Nadzri Osman

College of Business, School of Technology Management and Logistic,
University Utara Malaysia, 06010, Sintok, Kedah, Malaysia
Email: [1]rubykorean@gmail.com, [2]yanly_0613@live.com, [3]pisteosmxy1214@gmail.com

ABSTRACT

In any construction projects will face of many challenges such as safety, cost, partnering, cultural change and the quality material that supply by supplier. In this literature review is too carried out the failure cost that will face in construction project. This paper an aim is to explore the phases of methodology, underlying the failure cost in the construction industry. Next, this literature review also will carry out the most recurrent failure sources. Besides this, this paper also will identify the inter-relationship among the failure costs is affected by the degree of the interaction between different parties that will involved in the project.

Keywords:

quality material, failure cost, construction project

1.0 Introduction

In construction project, many companies are unaware of their budget. There are some factors that may arises failure costs such as poor planning, design errors, poor communication, and the condition of the material as well as many others. The adoption of better project management strategies to avoid and possibly eliminate failure sources can take place so that the failure costs can reduced. The methodology will be taken from internet to find out the sources and the solution that did by company. Besides this, we also will identity the defect of the costs in construction project. This paper concludes with the description and discussion based on the knowledge that gain from the journal and article that found.

2.0 Failure costs and cost Predictability

2.1 Definition of the failure costs

Failure costs is a quality control costs that are associated with products or services that have been found not to conform to requirements as well as that is related to costs. Failure cost can be dividing into external failure costs and internal failure costs. An external failure cost is a category of quality costs incurred because products fail to conform to requirements after being sold to customers. For example, warranty costs, returns costs and lost sales. An internal failure cost is a category of quality costs incurred because products and services fail to conform to requirements prior to external sale, such as scrap and rework.

The increasing pressure on construction projects described above comes at a time when construction are realizing that significant part of the construction costs are unnecessary and can be avoided. Failure costs in construction are defined as all unnecessary and avoidable costs incurred throughout the project due to the product and processes that can manifest themselves in form of costs overrun, time delays and the material in the poor condition.

In construction project, the resources can be quantified in monetary terms such as time, labor, material, equipment, overheads and other input. Any failure occurrence in process in the combination of them will consequently results in the usage of the additional and unnecessary resources. Processes failures are derived from inefficient processes that require unnecessary and additional resources.

2.2 Definition of the cost Predictability

Cost predictability also known as cost estimation. Cost predictability is the prediction of the cost estimated in construction project. It is a cost approximation to the construction project to avoid cost overrun. A construction general contractor or subcontractor normally prepare definitive cost estimate to prepare in the construction bidding process to compete for award of the contract.

Although many estimators participate in the bidding and procurement processes, those are not a necessary function of the cost estimation preparation.

2.2.1 Cost estimation methods

Cost estimation is mixes by two portion which is fixed portion and variable portion. There are a handful of methods used by managers to break the mixed costs in two manageable components which is fixed costs and variable costs. There are four methods of cost estimation to be used for calculation which is account analysis, scatter graphs, high-low method and linear regression. The cost formula that always used in the four method is $y = mx + c$.

Account analysis is to identify the cost behavior by looking at the cost and guessing most likely type of cost behavior. It is most often used by accountants or managers who are familiar with the cost within an account. Total of fixed costs and variable costs need to determine before substituted the number into the cost formula. Variable costs per unit will determine by dividing the total of all variable costs that identified by the number of the units produced or sold.

Scatter Graphs can provide a good visual picture of the costs at different activity levels. However, it is hard to visualize the line through the data points id the data is varied. The variable costs per unit is identify through the slope that are measure of rise over run.

High-low methods are uses the highest and lowest activity levels over a period of time to estimate the portion of the mixed costs. It is only uses the high and low activity levels to calculate the variable and fixed costs so that it may be misleading if the high and low activity levels are not representative of the normal activity. The high-low method is most accurate when the high-low levels of activity are representation of the majority of other points. The variable costs per units for high-low methods is determine by using the mathematical formula for a slope where you take divide the change in cost by the change in activity.

Linear function is useful in predicting cost amounts different levels of activity. They want to plan for future operations often through what if analysis and budgets. There is no need to analyze a cost to break it down into fixed and variable portions if already know whether it is variable or fixed. The goal is to determine the variable cost per units and total fixed costs to plug into the cost equation.

2.2.2 Improving the cost Predictability

At the early project life cycle such as before the requirements are well-defined and before accurate estimates are available, owners will need to set budgets. The challenge for all stakeholders is to ensure that the adopted to ensure the desired or required, degree of cost predictability. There are three recommendations should be considered to improve the cost predictability which is before tender, during tender and after tender. Before tender it is include sufficient contingency to address market volatility, timing of construction and exclusions in the estimate.

Besides this, it is consider possible scope variations in the tender as contingency to adjust to the owner's budget and give the designers sufficient time to finalize 100% bid documents for the pre-tender estimate. During tender, owner will keep the cost consultant involved during the tender period. Besides this, monitor addenda changes and bidding the environment and revise the estimates to reflect scope changes and addenda. After tender, they will involve the cost consultant in the post tender review then analyze the bid results against estimates for lessons learned. Besides this, they will consider value engineering to improve bid versus estimate variations and keep a record of historical estimate versus bid data.

2.3 Benchmarking

The Construction Task Force used the term benchmarking in two ways. In the traditional surveying sense of "a permanent physical mark of known elevation used to provide a point of beginning for determining elevations of other points in a survey" so that the National Key Performance Indicators will become known reference points to measure the changes in the performance of the industry as a whole. In the management sense of the continuous process of measuring products, services and practices against the toughest competitors or those recognized as industry leaders to promote the improvement of performance at the individual company level.

The management benchmarking model in Figure requires measurement, "benchmark matrices" and process improvement, "benchmark practices".

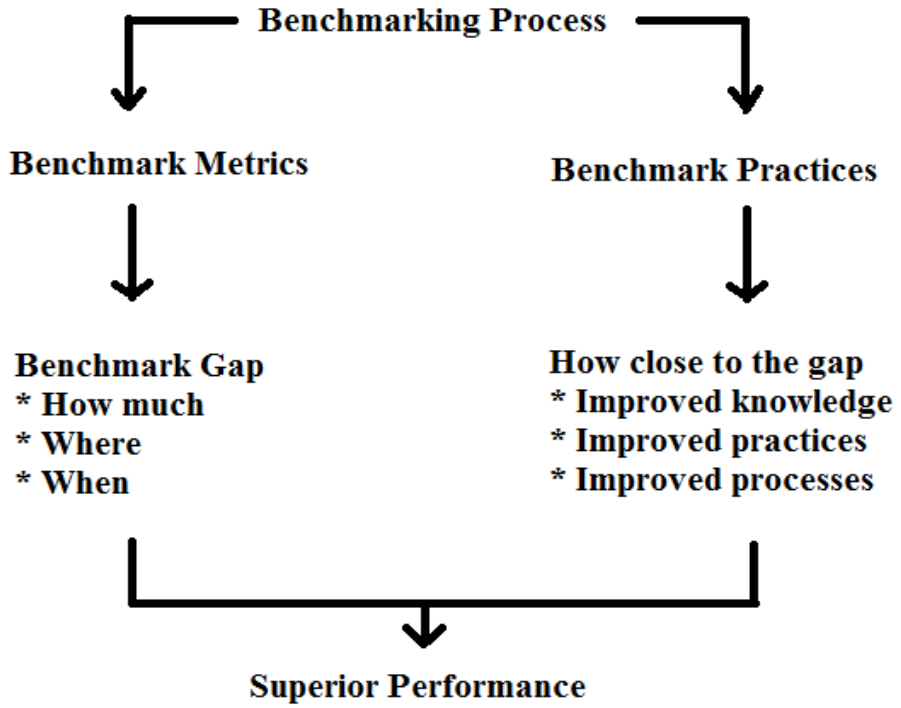

Figure 1: The Task Force prepared a set of measures that could be common to both uses.

3.0 METHODOLOGY

As I get from internet, the cause of the failure cost in construction project is to exposure to a high degree of uncertainly and risk partly due to the complex ground conditions. The experts that were selected on the basic of the experience and they must play a significant role inside a contractor organization. There are nine experts were interviewed and four of nine interviews work in companies that are involved in the projects as main contractors and the main five is sub contractors.

The purposes of the interviews are intended is to establish the order of the failure sources based on their frequent recurrence on construction projects and another purposed is to determine whether a relationship exists between one failure source using six point scales which ranged from never occurs to occur in every parts. In other words is the way of failure source may contribute to occurrence of other types of failure sources. In this case we will identify the relationship that exists between the failure sources. The relationship was measured using a five point scale which ranged from "very low relationship" to "very high relationship".

4.0 ANALYSIS

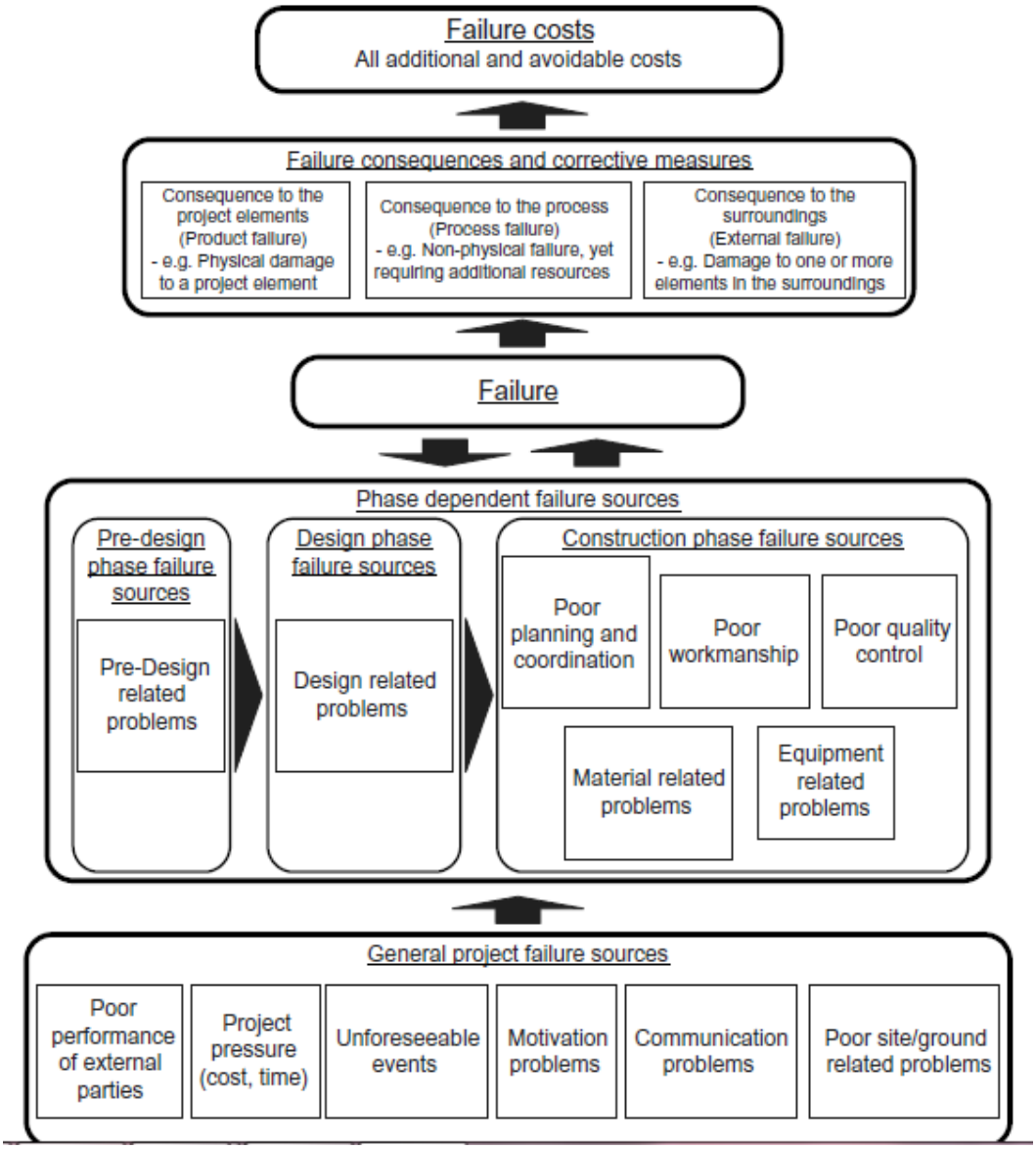

Figure 2: Data Analysis Process

The interviews showed that there is a general consequence about the definition of failure costs and the concept of the cost extend beyond expenditures to product quality and physical problem. All experts agreed than in most cases failure costs are due to problem related to process deficiencies need more time and cost. The expert indicated than 80% and 90% of the overall failure costs are due to the process problems whilst the remaining failure costs are due to physical and technical problems.

In the particular case of underground projects, the experts indicated that ground uncertainly and the interpretation of ground parameters plays a prime role in the occurrence of failure costs. The promotion of an open culture within the project organization will allow dealing with failures as they occur and hence will allow project management to implement corrective measures in order to reduce the impact of failure costs of the project. However early detection of failures allows to proactively reducing much higher failure costs in the projects.

The importance of establishing an open communication culture within the project in order to reduce the occurrence of failure costs in projects. Analysis of the results of the interviews have shown that the most recurrent failures sources are

problem that relate to site and ground, poor planning and coordination, communication and uncontrolled external factor such as government and poor performance of external factor such as client consultant. The interviews have also shown that amongst failure sources the strongest interrelationships exits between "poor communication" and "poor planning and coordination.

5.0 DISCUSSION

For those construction companies engaged in projects where production is controlled by equipment availability, with tunnelling as maybe the most extreme example, equipment replacement policies affect not just the cost of a machine but have a decisive effect on overall project cost and achieved profit. Although equipment replacement models described in the literature suggest that the consequential costs of equipment failure are significant and should be considered in replacement decisions, most fail to explicitly include consequential costs or fail to provide methods to calculate the consequential cost in complex systems.

This lack of consequential cost in a model seriously diminishes the effectiveness of a company's equipment replacement policies and the company's ability to earn a project. This work describes a case study that used simulation to quantify the consequential costs of equipment availability for a company engaged in tunnel-construction. The study includes the simulation of activities of the drill-and-blast method for five tunnel types. The simulation proved to be very valuable when seeking to evaluate consequential costs. The results indicate that consequential costs are very relevant to the replacement decision of the most expensive equipment. Also, the results show a significant effect of the consequential costs on the company's equipment replacement policies. Therefore, changes in existing policies to consider consequential costs have the potential of providing important future benefits for such companies.

6.0 CONCLUSION

This research work represents initial step that is intended to contribute to both science and practice. Its can contributes to the scientific body of knowledge by providing understanding of the mechanisms behind failure sources and how these evolve to become failure costs, and cost predictability in construction projects.
Besides that, it can understanding of these mechanisms will serve to develop a management framework for identifying and contribute to the industry by providing support to the industry in managing construction project, improving quality, most importantly, reducing the occurrence of potential failure costs, and improving cost predictability. Furthermore, the phenomenon of failure costs takes place in projects all over the world.
Moreover, we can understand that this mechanism provides a robust basis for developing an interactive model for the reduction of failure costs in construction projects. The work shows that the risk of failure costs is always present in construction projects. The extent of the impact of failures however can be reduced as the identification process is enhanced. This requires the establishment of strategies within the project that promotes the prevention of failures in the first place. Therefore, the further research will include the development of a model for strategy selection for proactive failure reduction in construction projects.
Nevertheless, we understanding the significant and apparently increasing variations between the bid and pre-tender estimate, it is necessary for the industry to analyze and improve on the various factors that affect cost predictability and provide the management of benchmarking. Within this context, and based on an understanding of how this component of the industry operates, issues and considerations are recommended for review and guidance during the estimate preparation process.

REFERENCES

Janet K. Yates and Edward E. Lockley(2002) *Documenting and Analyzing Construction Failures* Journal of Construction Engineering and Management

J.E. Avendano Castillo, S.H.Al-jibouri & J.I.M.Halman (2010) *Underlying mechanisms of failure costs in construction* Challenges, Opportunities and Solutions in Structural Engineering and Construction

Joseph Lipscomb, Marek Ancukiewicz, Giovanni Parmigiani, Vic Hasselblad, Greg Samsa, David(1998) *Predicting the Cost of Illness: A Comparision of Alternative Models Applied to Stroke* Vol. 18/No 2, Apr-Jun Suppl 1998

Peraturan Pelantikan Kontraktor Penyiap bagi projek sakit. Diakses pada 17 MEI 2013, daripada http://www.treasury.gov.my/pekeliling/spp/spp082009.pdf

Project Cost Estimation the Problem. Retrieved on April 23, 2013 from http://www.cs.odu.edu/~cs410/costing.htm